CLAIMS:

1. A process for preparing solid Fe(VI) salts which comprising two half-cells which are in an electrochemical contact with one another through an electrically neutral ionic conductor, wherein one of said half-cells comprises a cathode, while the other half-cell comprises at least 1% of weight of an iron containing material, wherein a power supply is used to oxidize the iron containing material to a solid Fe(VI) salt.

2. The process according to Claim 1, wherein said iron containing material is a solid or dissolved Fe(III) salt.

3. The process according to Claim 1, wherein said iron containing material is a solid or dissolved Fe(II) salt.

4. The process according to Claim 1, wherein said iron containing material is iron metal, Fe(0).

5. The process according to Claim 2 or 3, wherein said salt is an oxide or a hydroxide or contains the anions, selected from the group consisting of acetates, acetylsalicylates, alumminates, aluminum hydrides, amides, antomonides, arsenates, azides, benzoates, borates, bromides, bromates, carbides, carbonates, chlorates, perchlorates, chlorides, hypochlorites, chlorites, dithionate, chloroplatinates, chromates, citrates, fluorides, fluosilicates, fluosulfonates, formates, gallium hydrides, gallium nitrides, germanates, hydrides, iodates, iodides, periodate, laurates, manganates, malonates, permanganates, molybdates, myristates, nitrates,

nitrides, nitrites, oxalates, palmitates, phosphates, salicylates, selenates, selenides, silicates, silicides, stearates, succinates, sulfates, sulfides, sulfites, tartrates, thiocyanates, thionates, tungstates, halides, or chalcogenides.

6. The process according to Claim 2 or 3, wherein said salt includes a cation, selected from the group consisting of the alkali cations, H^+, the alkali earth cations, transition metal cations, or containing cations of group III, group IV and group V or ammonium or organic ammonium cations.

7. The process according to Claims 1 to 4, wherein said electrically neutral ionic conductor is an aqueous solution.

8. The process according to Claims 1 to 4, wherein said electrically neutral ionic conductor is a nonaqueous solution.

9. The process according to Claims 1 to 4, wherein said electrically neutral ionic conductor is a conductive polymer.

10. The process according to Claims 1 or 2, wherein said electrically neutral ionic conductor is a solid ionic conductor.

11. The process according to Claims 1 to 4, wherein said electrically neutral ionic conductor is a molten salt.

12. The process according to Claims 7 to 11, wherein said neutral ionic conductor contains a mixed salt.

13. The process according to Claims 7 to 9, wherein said neutral ionic conductor contains a mixed liquid.

14. A process for preparing solid Fe(VI) salts which comprising two half-cells which are in an electrochemical contact with one another through an electrically neutral ionic conductor, wherein one of said half-cells comprises a cathode, while the other half-cell comprises at least 1% of weight of an iron containing material, wherein a power supply is used to oxidize the iron containing material to a solid Fe(VI) salt, and in which said iron containing material may include, but is not necessarily limited to iron metal, Fe(0), or a solid or dissolved Fe(II) or Fe(III) salt, and wherein said neutral ionic conductor contains an organic solvent as a mixed liquid, and wherein said electrically neutral ionic conductor is an aqueous or nonaqueous solution, or a conductive polymer.

15. The process according to Claims 7-11, wherein said neutral ionic conductor contains the concentration of up to saturation in hydroxide ions.

16. The process according to Claim 12, wherein said mixed salt is an iron salt in a concentration of up to saturation.

17. The process according to Claim 16, wherein said iron salt an Fe(VI) salt.

18. The process according to Claim 16, wherein said iron salt an Fe(III) salt.

19. The process according to Claim 16, wherein said iron salt an Fe(II) salt.

20. The process according to Claim 12, wherein said mixed salt is an oxide or a hydroxide or contains the anions, selected from the group consisting of acetates, acetylsalicylates, alumminates, aluminum hydrides, amides, antomonides, arsenates, azides, benzoates, borates, bromides, bromates, carbides, carbonates, chlorates, perchlorates, chlorides, hypochlorites, chlorites, dithionate, chloroplatinates, chromates, citrates, fluorides, fluosilicates, fluosulfonates, formates, gallium hydrides, gallium nitrides, germanates, hydrides, iodates, iodides, periodate, laurates, manganates, malonates, permanganates, molybdates, myristates, nitrates, nitrides, nitrites, oxalates, palmitates, phosphates, salicylates, selenates, selenides, silicates, silicides, stearates, succinates, sulfates, sulfides, sulfites, tartrates, thiocyanates, thionates, tungstates, halides, or chalcogenides.

21. The process according to Claim 12, wherein said mixed salt includes a cation, selected from the group consisting of the alkali cations, H^+, the alkali earth cations, transition metal cations, or containing cations of group III, group IV and group V or ammonium or organic ammonium cations.

22. The process according to Claims 1 to 4, further characterized in that said iron containing material is in contact with a conductive material.

23. The process according to Claim 22, wherein said conductive material is selected from graphite, carbon black and a metal.

24. The process according to Claim 22, wherein said iron containing material can be a powder which can be pressed.

25. The process according to Claim 22, wherein said conductive material comprises a planar surface or a wire.

26. The process according to Claim 22, wherein said conductive material comprises a porous substrate or grid.

27. The process according to Claims 1 to 4 further comprising means to impede transfer of chemically reactive species between said anode and said other half cell.

28. The process according to Claim 27, wherein said means is a non conductive separator configured with open channels, grids or pores.

29. A process for preparing solid Fe(VI) salts which comprising two half-cells which are in an electrochemical contact with one another through an electrically neutral ionic conductor, wherein one of said half-cells comprises a cathode, while the other half-cell comprises at least 1% of weight of an iron containing material, wherein a power supply is used to oxidize the iron containing material to a solid Fe(VI) salt, and in which said iron containing material may include, but is not necessarily limited to iron metal, Fe(0), or a solid or dissolved Fe(II) or Fe(III) salt. The process further comprising means to impede transfer of chemically reactive

species between said anode and said other half cell which comprises a membrane positioned to separate said half cells.

30. A process for preparing solid Fe(VI) salts which comprising two half-cells which are in an electrochemical contact with one another through an electrically neutral ionic conductor, wherein one of said half-cells comprises a cathode, while the other half-cell comprises at least 1% of weight of an iron containing material, wherein a power supply is used to oxidize the iron containing material to a solid Fe(VI) salt, and wherein said cathode includes a non metal inorganic salt capable of being reduced.

31. The process according to Claim 1, wherein said cathode includes a metal inorganic salt capable of being reduced.

32. The process according to Claim 1, wherein said cathode includes an organic compound capable of being reduced.

33. The process according to Claims 1, further characterized in that said neutral ionic conductor contains 0.1 to 50% of an added material to modify the Fe(VI) salt production.

34. The process according to Claims 1 to 4, further characterized in that said iron containing material contains contains 0.1 to 50% of an added material to modify the Fe(VI) salt production.

35. The process according to Claim 33 or 34, wherein said added material is a Ba(II) compounds.

36. The process according to Claim 33 or 34, wherein said added material is an oxygen containing compound, such as an oxide or hydroxide compound.

37. The process according to Claim 33 or 34, wherein said added material is an indium containing compound.

38. The battery according to Claim 33 or 34, wherein said added material is a manganese containing compound.

39. The process according to Claim 33 or 34, wherein said added material, is a lithium containing compound.

40. The process according to Claim 33 or 34, wherein said added material is a tin containing compound.

41. A process for preparing solid Fe(VI) salts which comprising two half-cells which are in an electrochemical contact with one another through an electrically neutral ionic conductor, wherein one of said half-cells comprises a cathode, while the other half-cell comprises at least 1% of weight of an iron containing material, wherein a power supply is used to oxidize the iron containing material to a solid Fe(VI) salt, and in which said iron containing material may include, but is not necessarily limited to iron metal, Fe(0), or a solid or dissolved Fe(II) or Fe(III) salt. The process is further characterized by comprising a tungsten containing compound as 0.1 - 50% added material in said neutral

ionic conductor and/or in said iron containing material to modify the Fe(VI) salt production.

42. The process according to Claim 33 or 34, wherein said added material is a cobalt containing compound.

43. The process according to Claim 1, wherein said cathode includes an oxide or a hydroxide or contains the anions, selected from the group consisting of chalcogenide, chromate, molybdate, silicate, malonate, succinate, tartrate, selenate, sulfate, sulfite, halide, nitrate, bromate, chlorate, perchlorate, acetate, oxalate, carbonate, benzoate, hypochlorite, chlorite, dithionate, formate, iodate, periodate, carbonates, acetates, acetylsalicylates, alumminates, aluminum hydrides, amides, antomonides, arsenates, azides, benzoates, borates, bromides, carbides, chlorates, chlorides, chloroplatinates, chromates, citrates, fluorides, fluosilicates, fluosulfonates, gallium hydrides, gallium nitrides, germanates, hydrides, iodides, laurates, manganates, permanganates, molybdates, myristates, nitrates, nitrides, nitrites, oxalates, palmitates, phosphates, salicylates, selenides, silicates, silicides, stearates, sulfates, sulfides, sulfites, tartrates, thiocyanates, thionates, or tungstates.

44. A process for preparing solid Fe(VI) salts which comprising two half-cells which are in an electrochemical

contact with one another through an electrically neutral ionic conductor, wherein one of said half-cells comprises a cathode, while the other half-cell comprises at least 1% of weight of an iron containing material, wherein a power supply is used to oxidize the iron containing material to a solid Fe(VI) salt, and wherein said cathode includes a cation, selected from the group consisting of the alkali cations, H^+, the alkali earth cations, transition metal cations, or containing cations of group III, group IV and group V or ammonium or organic ammonium cations, or a lithium cation and a material capable of incorporating the lithium ions, consisting of a carbon based material, or a tin based material, or a lithium intercalating material.